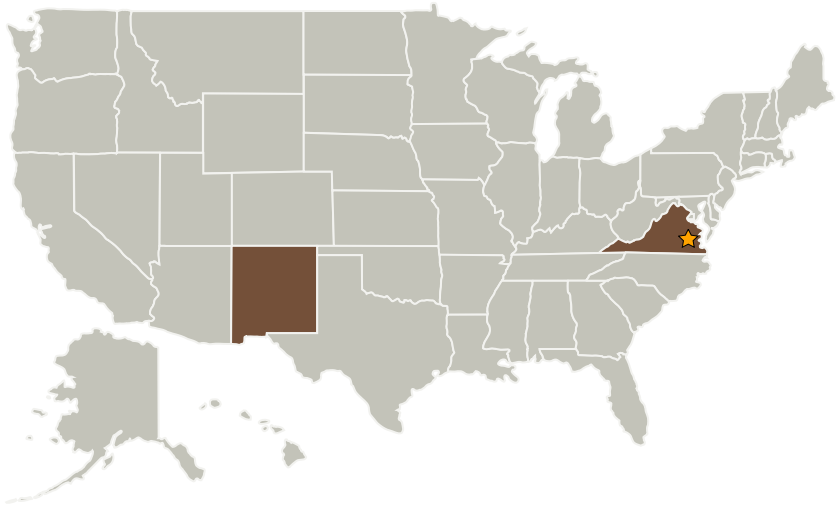
Vibration Energy Harvesting for SHM Sensors, Phase I

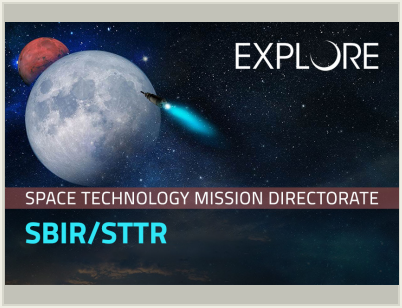
Completed Technology Project (2006 - 2006)

Project Introduction

Wireless sensors show enormous promise for safety improvements and cost reductions in monitoring the structural health of aircraft and spacecraft. A significant challenge for wireless sensors is power. Because of the labor and associated costs associated with changing hundreds, if not thousands of batteries, combined with the fact that many will be deployed in inaccessible locations, these systems will have to rely on harvesting energy from the environment to provide long-lived power. TPL and Washington State University (WSU) propose to develop a vibrational energy harvesting system based on the P3 (Palouse Piezo Power) Micropower Generator. The P3 is a patented, MEMS-based, piezoelectric membrane generator that has been demonstrated to operate over 1 billion cycles. In this effort, TPL will team with WSU researchers to develop a microfabricated proof mass for coupling vibrational energy into the piezoelectric membrane and to develop packaging for the device so it can be deployed in real world situations. Combined with TPL's patented microbatteries and microsupercapacitors for energy storage, the proposed system will provide a stand-alone power source that does not need recharging or refueling for wireless structural health monitoring (SHM) systems.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
TPL, Inc.	Supporting Organization	Industry	Albuquerque, New Mexico

Primary U.S. Work Locations	
New Mexico	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines